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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
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09/414,520 10/08/99 TAKAHASHI

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EXAMINER

ZERVIGON, R.

ART UNIT

PAPER NUMBER

1763
DATE MAILED:

02/26/01

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary

Application No.
09/414,520

Applicant(s)
Takahashi et al

Examiner
Rudy Zervigon

Group Art Unit
1763



☒ Responsive to communication(s) filed on Oct 8, 1999

☐ This action is **FINAL**.

☐ Since this application is in condition for allowance except for formal matters, **prosecution as to the merits is closed** in accordance with the practice under *Ex parte Quayle*, 35 C.D. 11; 453 O.G. 213.

A shortened statutory period for response to this action is set to expire 3 month(s), or thirty days, whichever is longer, from the mailing date of this communication. Failure to respond within the period for response will cause the application to become abandoned. (35 U.S.C. § 133). Extensions of time may be obtained under the provisions of 37 CFR 1.136(a).

Disposition of Claim

☒ Claim(s) 1-10 is/are pending in the application

Of the above, claim(s) _____ is/are withdrawn from consideration

☐ Claim(s) _____ is/are allowed.

☒ Claim(s) 1-10 is/are rejected.

☐ Claim(s) _____ is/are objected to.

☐ Claims _____ are subject to restriction or election requirement.

Application Papers

☒ See the attached Notice of Draftsperson's Patent Drawing Review, PTO-948.

☐ The drawing(s) filed on _____ is/are objected to by the Examiner.

☐ The proposed drawing correction, filed on _____ is ☐ approved ☐ disapproved.

☒ The specification is objected to by the Examiner.

☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

☒ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

☒ All ☐ Some* ☐ None of the CERTIFIED copies of the priority documents have been

☒ received.

☐ received in Application No. (Series Code/Serial Number) _____

☐ received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

*Certified copies not received: _____

☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

☒ Notice of References Cited, PTO-892

☐ Information Disclosure Statement(s), PTO-1449, Paper No(s). _____

☐ Interview Summary, PTO-413

☒ Notice of Draftsperson's Patent Drawing Review, PTO-948

☐ Notice of Informal Patent Application, PTO-152

— SEE OFFICE ACTION ON THE FOLLOWING PAGES —

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DETAILED ACTION

Specification

1. 35 U.S.C. 112, first paragraph, requires the specification to be written in "full, clear, concise, and exact terms." The specification is replete with terms which are not clear, concise and exact. The specification should be revised carefully in order to comply with 35 U.S.C. 112, first paragraph. Examples of some unclear, inexact or verbose terms used in the specification are: "Next, the high frequency power supply is tried to be operated,..." (Page 19, line 20; page 23, lines 10-11; page 24, line 20)

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 2 and 7 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. "Temperature" does not have units of energy as eV.

5. Claims 1-10 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. "middle degree" dissociation is indefinite to a person of ordinary skill in the art because the "degree" of dissociation is not associated with length as implied by "middle".

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6. The claims are generally narrative and indefinite, failing to conform with current U.S. practice. They appear to be a literal translation into English from a foreign document and are replete with grammatical and idiomatic errors. Claims 4 and 9 for example: “A drive of a plasma exciting power supply is carried out intermittedly..”

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Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which the subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 1, 2, 4, 5, 6, 7, 9, 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Satou et al (U.S.Pat. 5,961,850) in view of H. Nishino et al. Satou et al describes:

- i. a plasma processing apparatus (Figure 1, column 2, lines 32-58) having a vacuum processing chamber (Figure 1, item 10, column 3, lines 10-15)
- ii. a sample table (Figure 1, item 11, column 2, lines 32-58) for mounting the sample (Figure 1, item 13, column 2, lines 32-58) which is processed in the vacuum processing chamber (Figure 1, item 10, column 3, lines 10-15)
- iii. a plasma generation means (Figure 1, column 2, lines 45-52), wherein a plasma processing (column 2, lines 59-67) is carried out by generating a plasma in response to introduction of a gas (column 2, lines 59-62) which generates a plasma in which the degree of plasma dissociation is a "middle" degree
- iv. A temperature of a region (items 36, 37; column 2, lines 52-58) which forms a side wall of the vacuum processing chamber (Figure 1, item 10, column 3, lines 10-15) is controlled to have a range of 10 °C to 120 °C (column 3, lines 10-21)

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- v. electron "temperatures" are affixed under corresponding energies as per the Boltzman relationship: $E = (2/3)kT$
- vi. plasma generation means (Figure 1, column 2, lines 47-51)
- vii. A plasma processing (column 2, lines 59-67) apparatus (Figure 1, column 2, lines 32-58) wherein in the plasma generation means (Figure 1, column 2, lines 45-52) includes a drive of a plasma exciting power supply carried out intermittently ("frequency" of item 12 and the microwave power application means - column 2, lines 39-48)
- viii. A plasma processing (column 2, lines 59-67) apparatus (Figure 1, column 2, lines 32-58) wherein as a means for adjusting a temperature of the vacuum wall, a temperature adjusted coolant (column 3, lines 22-23) medium is used.

Satou et al does not specifically describe:

- ix. A gas which contains at least carbon and fluorine and a gas species is generated which contains carbon and fluorine according to a plasma dissociation
- x. plasma generation means which generates a plasma in which the degree of plasma dissociation is a "middle" degree and the gas species containing carbon and fluorine is generated fully in the plasma

H. Nishino et al demonstrate:

- xi. A gas which contains at least carbon and fluorine ("CF₄", Sections II & III), and a gas species is generated which contains carbon and fluorine according to a plasma dissociation

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- xii. the plasma processing apparatus (Figure 1) comprising plasma generation means (Figure 1, 2.45GHz microwave) which generates a plasma in which the degree of plasma dissociation is a "middle" degree and the gas species containing carbon and fluorine ("RIE", Section III) is generated fully in the plasma

It would have been obvious to one of ordinary skill in the art at the time the invention was made to implement H. Nishino et al's fluoromethane ("CF₄", Sections II & III) as Satou et al's "etchant" gas (column 2, lines 59-62).

Motivation for implementing H. Nishino et al's fluoromethane ("CF₄", Sections II & III) as Satou et al's "etchant" gas (column 2, lines 59-62) is drawn from common industrial practices, and more specifically, as discussed by H. Nishino et al, the gas can be used when "rough Si surfaces can be smoothed and Si trench corners can be rounded off ..." (abstract) .

9. Claims 3 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Satou et al (U.S.Pat. 5,961,850), as applied to claims 1, 5, 6, 9, and 10 above, and further in view of H. Nishino et al. Satou et al does not describe the precise frequency of microwave application as being between 300MHz and 1GHz. H. Nishino et al describes a microwave plasma apparatus with 2.45GHz microwave (Section II.)

It would have been obvious to one of ordinary skill in the art at the time the invention was made to reduce the microwave frequency power application, as taught by H. Nishino et al, in order to impart the desired extent of dissociation.

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Motivation for reducing the microwave frequency power application, as taught by H. Nishino et al, is to impart the desired extent of dissociation.

The following results may support the rejection:

10.MPEP 2144.05

OPTIMIZATION WITHIN PRIOR ART CONDITIONS OR THROUGH ROUTINE EXPERIMENTATION

Generally, differences in concentration or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical. "[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." In re Aller , 220 F.2d 454, 105 USPQ 233, 235 (CCPA 1955) (Claimed process which was performed at a temperature between 40 _ C and 80 _ C and an acid concentration between 25 and 70% was held to be prima facie obvious over a reference process which differed from the claims only in that the reference process was performed at a temperature of 100 _ C and an acid concentration of 10%). See also In re Hoeschele , 406 F.2d 1403, 160 USPQ 809 (CCPA 1969) (Claimed elastomeric polyurethanes which fell within the broad scope of the references were held to be unpatentable thereover because, among other reasons, there was no evidence of the criticality of the claimed ranges of molecular weight or molar proportions.). For more recent cases applying this principle, see

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Merck & Co. Inc . v. Biocraft Laboratories Inc. , 874 F.2d 804, 10 USPQ2d 1843 (Fed. Cir.), cert. denied , 493 U.S. 975 (1989), and In re Kulling , 897 F.2d 1147, 14 USPQ2d 1056 (Fed. Cir. 1990).

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Conclusion

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. 5,254,171; 5,589,041; 6,015,465; 5,429,070; *J.Vac.Sci.Technol.A* 13(6), Nov/Dec 1995; *Physics of Fluids B: Plasma Physics* 5(6), June 1993, pp.1902-1910 <abstract> *J.Vac.Sci.Technol.A* 15(3), May/Jun 1997 pp.626-632

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Rudy Zervigon whose telephone number is (703) 305-1351. The examiner can normally be reached on a Monday through Thursday schedule from 8am through 7pm. The official after final fax phone number for the 1763 art unit is (703) 305-3599. Any Inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Chemical and Materials Engineering art unit receptionist at (703) 308-0661. If the examiner can not be reached please contact the examiner's supervisor, Gregory L. Mills, at (703) 308-1633.


GREGORY MILLS
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